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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/199,816	11/25/1998	MASATO SHIMADA	Q52241	4106

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EXAMINER	
NGUYEN, LAM S	
ART UNIT	**PAPER NUMBER**
2853	

DATE MAILED: 11/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/199,816	SHIMADA ET AL.	
	Examiner	Art Unit	
	LAM S. NGUYEN	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,10-12,21-23,36,38,40-42,48,51,52 and 67* is/are pending in the application.

4a) Of the above claim(s) *4-9,13-19,24-35,37,39,43-47,49,50 and 53-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,10-12,21-23,36,38,40-42,48,51,52 and 67* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 January 1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The applicant is noticed that claims 4-9, 13-19, 24-35, 37, 39, 43-47, 49-50, 53-55, and 64-66 have been withdrawn from consideration due to the applicant's non-election filed on 05/17/2004. As a result, the status of the claims must be correctly indicated as "Withdrawn".

Claim Objections

Claims 21-23 are objected to because of the following informalities: Claims 21-23 depend on claim 20 that has been canceled. Appropriate correction is required. However, in the below rejection, claims 21-23 are assumed to depend on claim 1 for further examination purpose.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-3, 10, 21, 36, 40-42, 48, 51-52/1-3, 51-52/10, 51-52/48, and 67 are rejected under 35 U.S.C. 102(b) as being anticipated by Hashizumi et al. (EP 786,345) supported by Kawasaki et al. (US 5631463). (*Note: This is a multiple reference 35 U.S.C. 102 rejection (MPEP 2131.01) based on the Hashizumi reference as primary and the Kawasaki reference that shows inherence*).

Regarding claim 1:

Hashizumi et al. discloses in an ink jet recording head of the type having

a flow passage formation substrate (*FIG. 12, element SI*) in which a pressure

generation chamber is formed (*FIG. 12, element IT*), said pressure generation chamber being in communication with a nozzle opening (*FIG. 12, element NH)*,

a diaphragm (*FIG. 12, element VP)* provided on said flow passage formation substrate, said diaphragm defining an interior wall of said pressure generation chamber, and

a piezoelectric element (*FIG. 12, elements UE, PZ, BE)* provided on said diaphragm (*FIG. 12, element VP)*, said piezoelectric element having at least a lower electrode (*FIG. 12, element BE)*, a piezoelectric layer (*FIG. 12, element PZ)*, and an upper electrode (*FIG. 12, element UE)*, the improvement comprising:

Even though, Hashizumi et al. teaches wherein a part of the lower electrode, which is the at least one of the group consisting of said diaphragm and said piezoelectric element, in an area opposed to said pressure generation chamber is removed thereby forming a removal part (*FIG. 12: The portion ta2 of the electrode thin film BE*) (**Regarding claims 40-42**), Hashizumi et al. is silent wherein the lower electrode includes a pre-established compressive stress (**Regarding to claim 67)** and a tensile stress. However, Hashizumi et al. teaches that during the formation of the piezoelectric layer, the lower BE electrode made of Pt is heat treated (*column 11, line 30-41and column 6, line 50-56*). As a result, the Pt heat-treated lower electrode has compression stress and tensile stress, inherently, as supported by Kawasaki et al.'s teaching that a Pt electrode has a large compression stress after the piezoelectric film formation and has a low internal stress such as tensile stress after heat treatment (*column 4, lines 5-10 and FIG. 3*).

Regarding to claim 2: wherein the compression film is other than the piezoelectric layer (*FIG. 12: The layer BE*).

Regarding to claims 3, 41: wherein the compression film has at least a part in the thickness direction removed only in a portion along margins of the pressure generation chamber on both sides of said piezoelectric element in a width direction thereof (*FIG. 12: The portions ta2*).

Regarding to claim 10: wherein the compression film forms at least a part of an elastic film forming at least a part of the diaphragm (*Fig. 12-13: The BE electrode layer is used as a diaphragm*).

Regarding to claims 21, 36: wherein the lower electrode is made of a metal material, wherein the metal material is selected from platinum, palladium, iridium, rhodium, osmium, ruthenium, and rhenium, and compounds thereof (*column 9, lines 25-35: The diaphragm VE also serving as another electrode is made by Pt*).

Regarding to claim 48: wherein a stress of the piezoelectric layer when a drive force load is imposed on said piezoelectric element is equal to a stress at the piezoelectric layer formation time or is larger in a tension direction (*FIG. 12: The load on the piezoelectric layer must be greater than a tensile stress in order to allow the layer is deformed*).

Regarding to claim 51/1-3,10,21,36,40-42,48: wherein the pressure generation chambers are formed on a silicon monocrystalline substrate by anisotropic etching (*col. 12, lines 40-46 and column 7, line 57 to column 8, line 5)* and the layers of said piezoelectric element are formed by film forming and lithography process (*column 1, line 57 to column 2, line 5*). (*In addition, because these claims are apparatus claims, the limitations that claim the method for forming the pressure generation chambers on the substrate and the layers of the piezoelectric element are considered but not given patentable weight*).

Regarding to claims 52/1-3,10, 21,36,40-42,48: An ink jet recorder comprising an ink jet recording head as claimed in claims 1-3, 10, 48 (*column 1, lines 4-10*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 11-12, 51/11-12, 52/11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashizumi et al. (EP 786,345) supported by Kawasaki et al. (US 5631463), in view of Ichikawa (US 6022458).

Hashizumi, as supported by Kawasaki et al., discloses the claimed invention as discussed above and wherein the elastic film is made of the compression film only (*Fig. 12-13*). However, even though Hashizumi teaches that the compression film is made of a monocrystalline substance, but is silent whether the residue of the compression film forming a part of the elastic film is made of a polycrystalline substance.

Ichikawa suggests that during a film producing process, a polycrystalline substance layer enables to form a denser film than a monocrytalline substance layer (*column 6, line 58 to column 7, lines 4*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify the compression film disclosed by Hashizumi, as supported by Kawasaki et al., such as using polycrystalline substance instead of monocrytalline substance as

suggested by Ichikawa. The motivation for doing so would have been to enable formation of a dense film as taught by Ichkawa (*column 6, line 58 to column 7, lines 4*).

3. Claims 22-23, 38, 51/22-23, 51/38, 52/22-23, 52/38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashizumi et al. (EP 786,345) supported by Kawasaki et al. (US 5631463), in view of Yokoyama et al. (US 5831299).

Hashizumi, as supported by Kawasaki et al., discloses the claimed invention as discussed above except wherein the lower electrode is made of metal oxide or metal nitride selected from titanium nitride, niobium nitride, zirconium nitride, tungsten nitride, hafnium nitride, molybdenum nitride, tantalum nitride, chromium nitride, and palladium nitride, and compounds thereof.

Yokoyama et al. discloses a thin ferroelectric film element comprising lower and upper electrodes, wherein the lower electrode includes a monolayer film of a high melting-point metal such as Ta, Ti, W, or a nitride thereof or an electrically conductive oxide (*column 5, lines 5-12*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify the lower electrode disclosed by Hashizumi, as supported by Kawasaki et al., so the electrode is made of a metal nitride such as a nitride of Ti as suggested by Yokoyama et al. The motivation for doing so would have been to obtain a high melting-point electrode as taught by Yokoyama et al. (*column 5, lines 5-12*).

Response to Arguments

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. The new ground of rejection is made based on the previous

cited reference and a new cited reference that shows inherence not disclosed in the primary reference.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S. NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LN
10/02/2005

Hai Phan

HAI PHAM
PRIMARY EXAMINER